



Contribution ID: 282

Type: **Poster Presentation of 1h45m**

## Optimal Design of the LTS Magnet employing Genetic Algorithm for EMPS

*Tuesday, August 29, 2017 1:15 PM (1h 45m)*

A 5 T low temperature superconducting magnet is designed and will be fabricated for EMPS (Electro-Magnetic Property measurement System) whose sample space is 50 mm in diameter. Since the sample space is twice larger than that of the conventional property measurement systems, it will be possible to measure the electro-magnetic properties of several samples at a time, therefore measurement time could be reduced. With the genetic algorithm incorporated with the linear-programming, optimal design of the 5 T LTS magnet was carried out; 50 mm space field uniformity, magnetic stress, critical current under the magnetic field and cryostat dimensions are considered in the optimizing process. The linear-programming restricts the magnet space and structure to minimize total volume of the wires. Meanwhile, the genetic algorithm calculates the layers, turns and detail dimensions of the magnet in the magnet space confined by the linear-programming. In addition, quench analysis employing finite difference equations in liquid helium was carried out to verify the thermal stability of the LTS magnet. The quench simulation code calculates heat transfer among the unit cells and joule heat of the magnet in three dimension space. The temperature as well as current profiles of the magnet during a quench is investigated using the simulation result.

### Submitters Country

South Korea

**Primary authors:** Dr JAE YOUNG , Jang (Korea Basic Science Institute); HWANG, Young Jin (Korea Basic Science Institute); Prof. LEE, Sangjin (Uiduk University); KIM, Myung Su (Korea Basic Science Institute); CHOI, Yeon Suk (Korea Basic Science Institute)

**Presenter:** Dr JAE YOUNG , Jang (Korea Basic Science Institute)

**Session Classification:** Tue-Af-Po2.10

**Track Classification:** G7 - Multi-Physics Design and Analysis